Demand Estimation Sub Committee
Post Nexus Algorithm Performance Measures

15th November 2016

Background

- Project Nexus introduces a revised allocation formula meaning some of the current Algorithm Performance measures become redundant. This is also an opportunity to consider new Strands and methods of analysis

- Initial discussions took place at the DESC meeting on 8th July 2015, regarding what NDM Algorithm Performance would look like post Nexus implementation

- At the DESC TWG meeting on 16th September 2015, the group reviewed four initial proposed strands of analysis:
  - Weather (SNCWV vs CWV) Analysis
  - Unidentified Gas Analysis
  - NDM Sample Analysis
  - Reconciliation Analysis

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Approach

- For clarification, the purpose of Algorithm Performance is to
  - Provide confidence in the NDM Supply Meter Point Demand formula
  - Identify possible areas of improvement for future demand modelling

- The following slides provide an update on what each of the proposed strands of analysis may look like with a more detailed explanation of the type of analysis performed

- Where appropriate, our aim is to:
  - Provide statistical measures of performance as well as visual representations
  - Develop a more flexible process for Algorithm Performance, allowing us to adapt the data summaries we analyse and how it is presented
  - Carry out 'regional' and 'year on year' comparisons

Strand 1 – Weather Analysis

Overview:

- An assessment of the actual weather conditions which prevailed during the gas year and its comparison against seasonal normal

Comparison Technique(s)

- Analysis of the WCF values (monitor fluctuations in relation to time of year)
- Daily comparisons of CWV vs SNCWV (by LDZ or overall GB)
- Overall CWV assessment by specific month, ranked coldest to warmest

What are the benefits:

- Monitor the suitability of current Seasonal Normal
- Helps to give some context to other strands of analysis

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Strand 1 – Weather Analysis

WCF Summary Statistics:

LDZ	WCF 2014/15 Standard Deviation	WCF 2014/15 Mean	95% of data within 2 standard deviations	
SC	1.191	-0.368	-2.749	2.014
NO	1.280	-0.019	-2.579	2.541
NW	1.434	-0.326	-3.194	2.542
NE	1.347	-0.095	-2.789	2.599
EM	1.325	-0.052	-2.702	2.598
WM	1.338	-0.174	-2.850	2.502
WS	1.123	-0.032	-2.278	2.213
EA	1.352	-0.022	-2.726	2.683
NT	1.386	-0.022	-2.793	2.749
SE	1.347	-0.006	-2.700	2.688
SO	1.193	0.071	-2.314	2.457
SW	1.165	-0.102	-2.432	2.228
WN	1.434	-0.326	-3.194	2.542

NOTE: values are for illustration purposes only

- The mean and standard deviation allow us to calculate a 'normal' distribution range for the WCF. Here we have calculated the 95% range. Often, values that are more than 2 standard deviations from the mean are regarded as unusual.

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Strand 1 – Weather Analysis

Daily comparisons of CWV vs SNCWV:

GB CWV vs SNCWV - Drop Bar

Legend: Colder than SNCWV (blue), Warmer than SNCWV (red), SNCWV (green line)
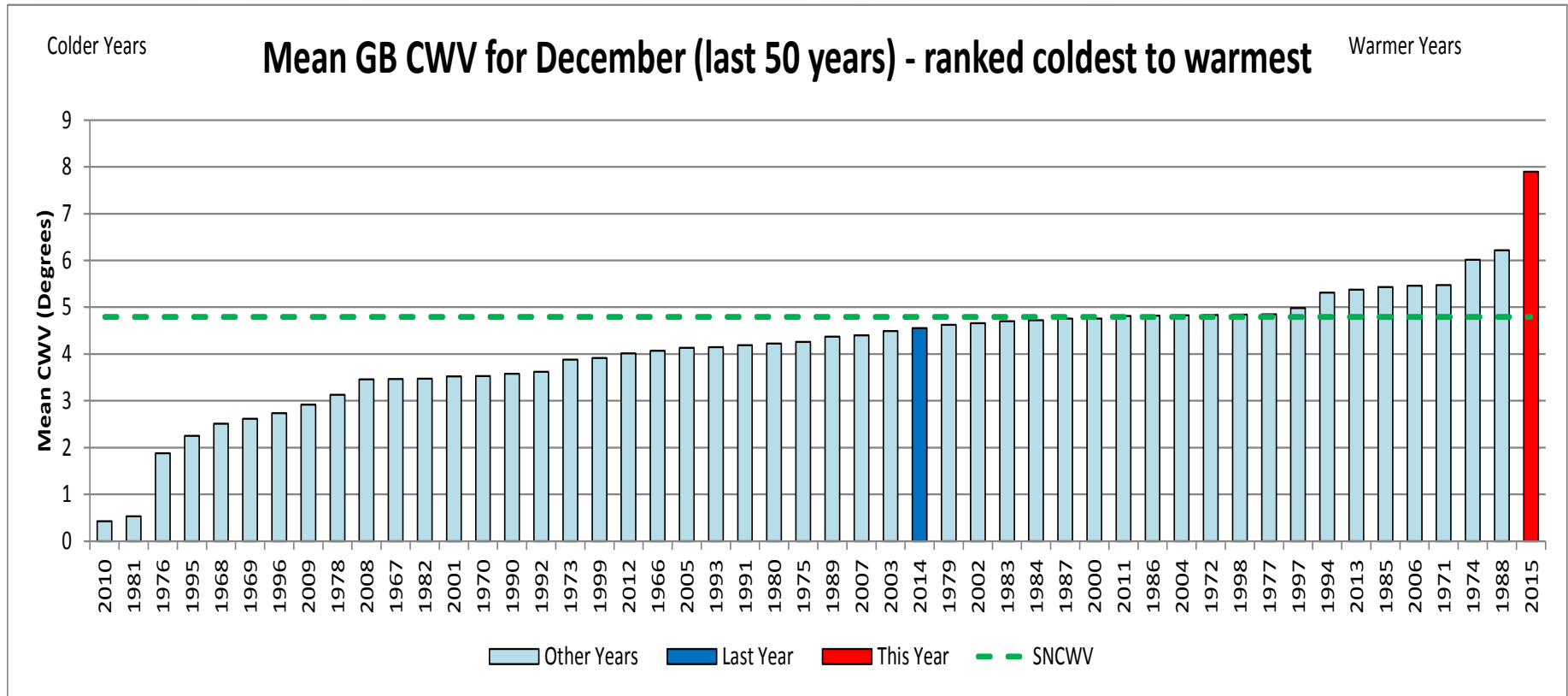
Y-axis: Degrees CWV (0–18)
X-axis: Gas day (01/10/2015 – 29/09/2016)
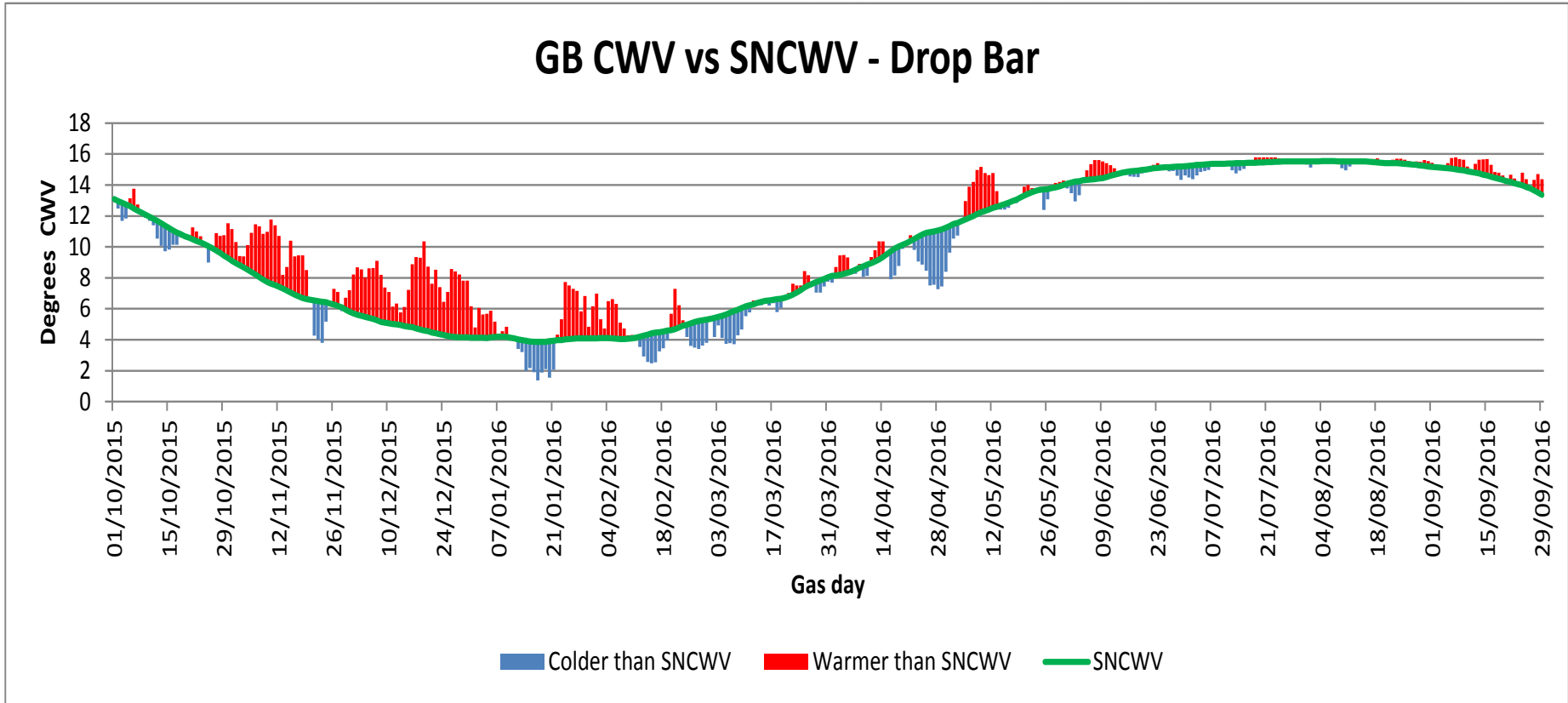
NOTE: values are for illustration purposes only

- Actual vs Normal Weather (CWV vs SNCWV)
- Available by GB or by individual LDZs

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Strand 1 – Weather Analysis

Overall CWV assessment by specific month:

Mean GB CWV for December (last 50 years) - ranked coldest to warmest

Colder Years   Warmer Years

NOTE: values are for illustration purposes only

- CWV assessment by specific month, ranked coldest to warmest (also available ranked in year order)
- Available for any month as far back as October 1960

Strand 2 – Unidentified Gas Analysis

Overview:

- An assessment of the levels of Unidentified Gas at D+5 Closeout in each LDZ

Comparison Technique(s)

- Report UG levels at closeout (by date and LDZ)
- Monitor movement of UG values throughout the closeout window and compare to closed out UG values (data permitting)

What are the benefits:

- Understand the association between UG level and under / over allocation
- Identify patterns of amendments in LDZ input or DM measurement values

Strand 2 – Unidentified Gas Analysis

Average percentage UG at D+5 Closeout:

Average % UG by month and LDZ
Gas Year 2014/15
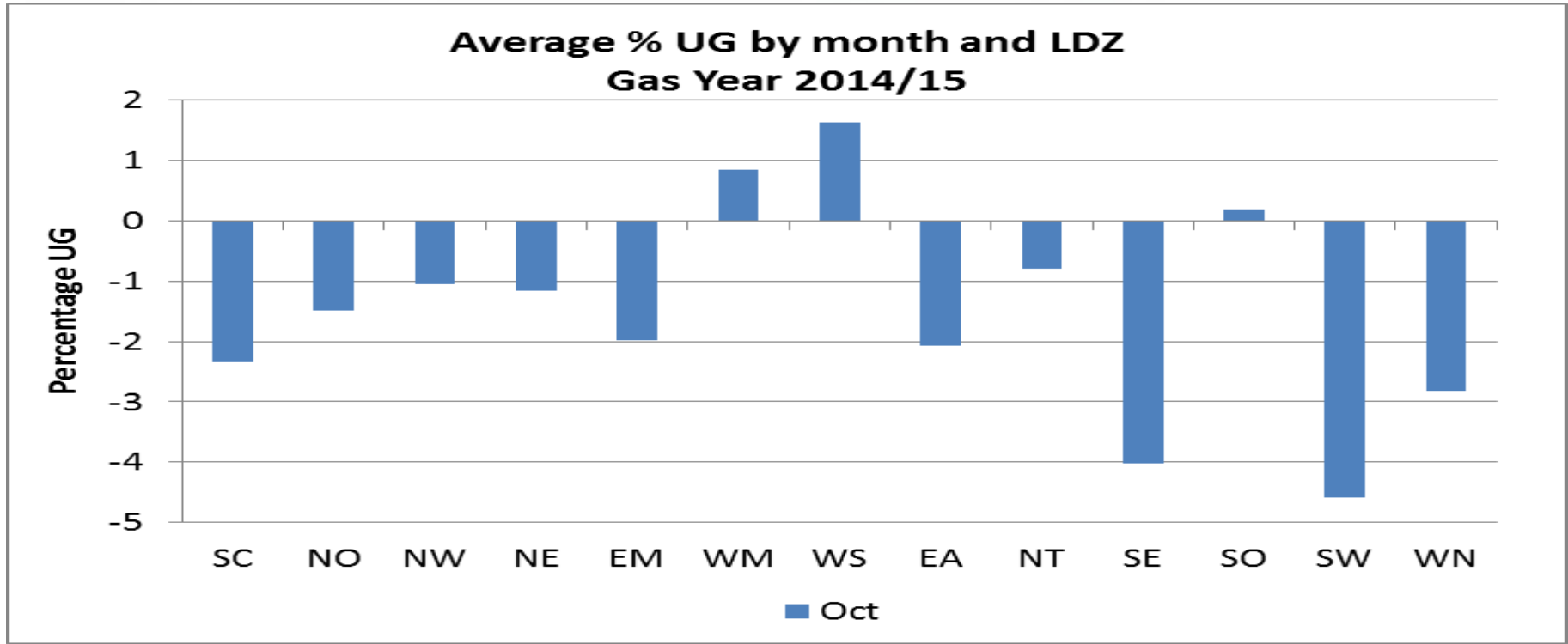
❖ See DESC presentation from 16th Feb 2016 for further information on UG

NOTE: values are for illustration purposes only

- Average percentage UG at D+5 Closeout by LDZ and month
- Available at various different levels (e.g. at daily, monthly, season level)

Strand 3 – NDM Daily Demand Analysis

Overview

- An evaluation by comparing actual daily demands for NDM supply meter points with estimates of their daily demands (as per the NDM Supply Meter Point Demand formula) across the range of EUCs.

- Previously known as 'NDM Sample Analysis' (rebranded to support identical analysis of other data sources)

Comparison Technique(s)

- Analysis of Daily Percentage Error (Actual – Allocated)

- Compare results from different data streams

What are the benefits:

- Assess the accuracy of the Demand Estimation Parameters used in the NDM Supply Meter Point Demand formula

Strand 3 – NDM Daily Demand Analysis

Proposals:

Complete analysis on two bases:

- MODEL (sample derived AQs; As Used ALPs & DAFs; real WCF values)
- RETRO (sample derived AQs; Latest ALPs & DAFs retro fitted; real WCF values)

Complete separate analysis using various data sources:

- NDM Sample Data (Xoserve & Third Party)
- Class 3 Supply Meter Points Reconciliation Data
- Any other NDM daily consumption data

Strand 3 – NDM Daily Demand Analysis

Average Error (Actual – Allocated) expressed as a percentage:

| Base	MODEL		Source	NDM Samp		LDZ(s)	All		Band(s)	All		Period	Gas Year
	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	All LDZs
01B	2.24%	1.19%	1.95%	1.72%	0.51%	0.52%	-	3.25%	-0.55%	0.02%	-0.25%	-1.24%	0.70%	0.80%
Num S. pts	222	222	222	241	233	233	-	222	252	234	216	235	230	2762
02B	-0.75%	0.07%	0.06%	-0.41%	0.46%	-0.74%	-1.78%	1.02%	0.39%	-5.52%	-1.42%	2.55%	1.10%	-0.43%
Num S. pts	111	102	154	113	160	135	3	80	186	185	165	142	133	1669
03B	1.77%	1.37%	-0.89%	0.29%	-0.05%	-0.08%	-1.65%	-1.84%	1.10%	-1.41%	-2.48%	-0.12%	-2.62%	-0.33%
Num S. pts	154	103	139	106	153	120	9	16	171	170	191	137	86	1555
04B	1.65%	1.20%	1.33%	-0.16%	-0.65%	1.06%	-1.59%	1.03%	-0.62%	0.85%	-1.05%	-1.61%	-0.80%	0.18%
Num S. pts	282	129	261	182	224	241	20	47	243	284	279	213	116	2521
05B	1.56%	1.35%	1.41%	1.36%	1.99%	0.48%	1.68%	4.57%	-1.55%	0.50%	-0.38%	0.79%	0.42%	0.94%
Num S. pts	232	84	153	84	158	167	19	37	84	176	133	109	72	1508
06B	1.82%	2.26%	3.17%	1.29%	2.55%	3.92%	-0.42%	-0.19%	2.78%	-0.75%	-1.61%	3.08%	3.42%	2.06%
Num S. pts	79	38	81	68	77	85	6	24	56	63	41	43	53	714
07B	0.69%	-1.86%	2.64%	-0.54%	1.60%	0.78%	-7.58%	-6.21%	0.04%	4.02%	1.40%	2.04%	-8.25%	0.10%
Num S. pts	29	24	45	38	57	33	8	10	20	19	18	17	24	342
08B	7.44%	-6.91%	-0.17%	-5.46%	-1.23%	-3.45%	-12.06%	2.37%	-9.32%	-2.75%	11.67%	16.96%	-0.83%	-1.19%
Num S. pts	7	12	35	14	41	32	4	11	15	19	5	8	14	217

Key: Under All. / Over All.

NOTE: values are for illustration purposes only

- Results based on two bases and available source data combinations
- Available at different summaries (e.g. by specific EUC band and date ranges)

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Strand 3 – NDM Daily Demand Analysis

Average Error (Actual – Allocated) expressed as a percentage:

Average Error (as a percentage)
Band 01B; OCT'14 - SEP'15; MODEL
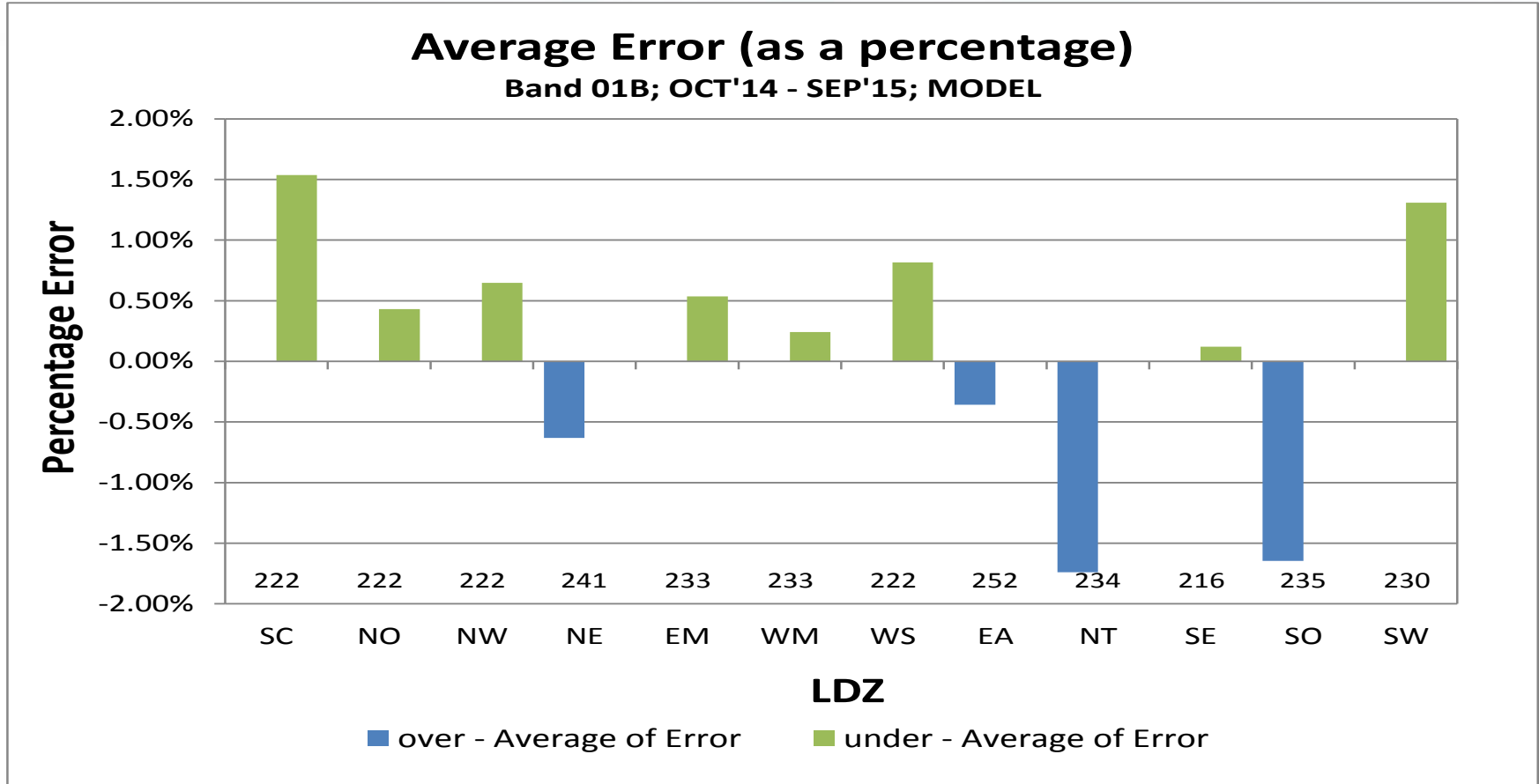
NOTE: values are for illustration purposes only

- Results available for various data combinations
- Values at the bottom of the chart display the no. of sample sites for the LDZ.

Strand 3 – NDM Daily Demand Analysis
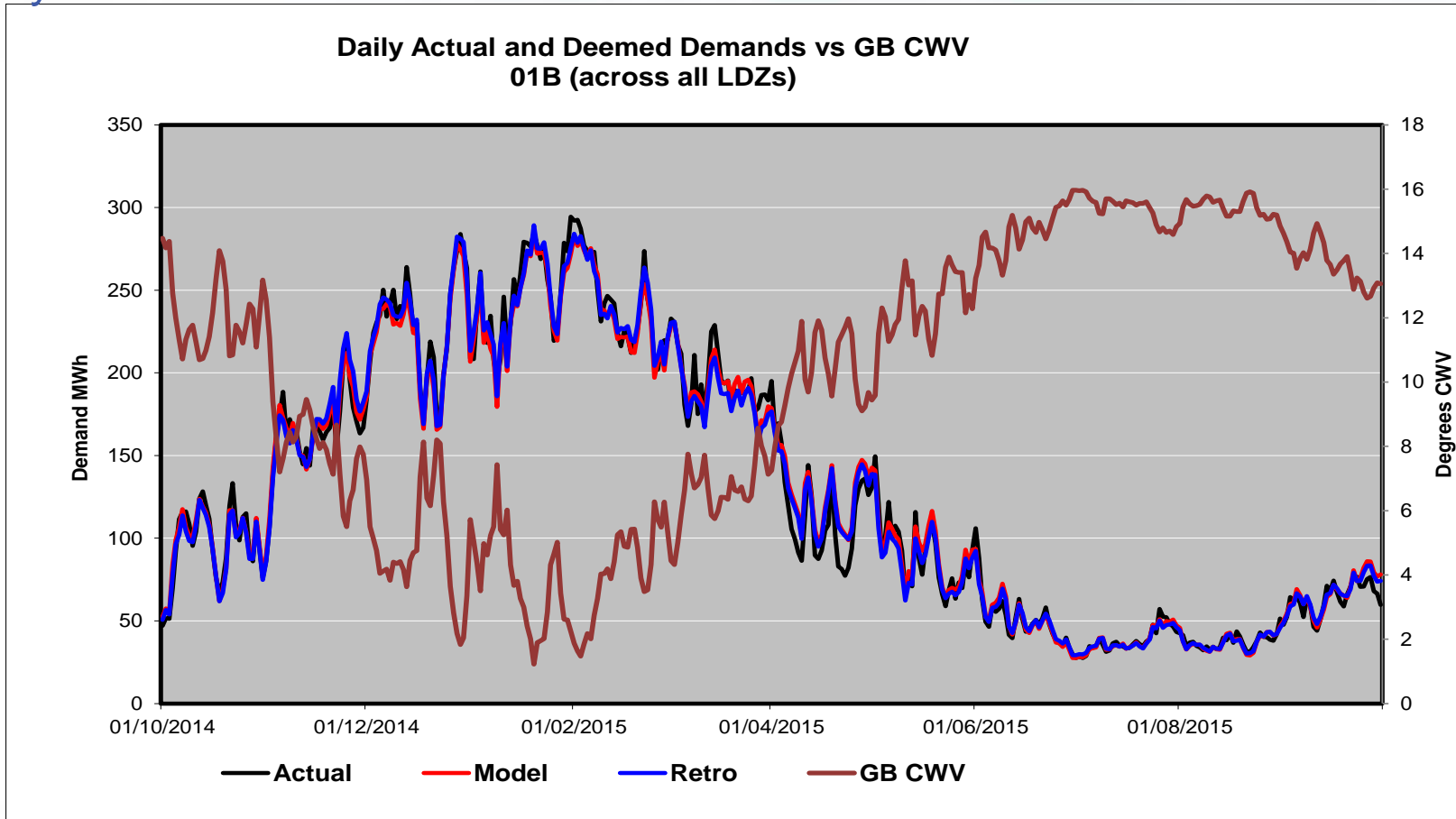
Mean Percentage Error (MPE):

Base	MODEL		LDZ(s)	All
Band(s)	01B		Period	Monthly

	Average Actual Demand	Average Deemed Demand	MPE	t-test for equal means
Oct	248.86	241.99	2.64%	✔
Nov	409.74	419.81	-2.46%	✔
Dec	590.65	587.58	0.58%	✔
Jan	636.40	632.08	0.72%	✔
Feb	567.14	564.89	0.46%	✔
Mar	506.03	488.76	3.44%	✔
Apr	291.50	314.30	-8.03%	✔
May	235.38	227.90	3.01%	✔
Jun	128.02	128.67	-0.64%	✔
Jul	97.96	97.27	0.84%	✔
Aug	97.25	96.06	1.47%	✔
Sep	158.90	165.51	-4.25%	✔

NOTE: values are for illustration purposes only

- 'MPE' allows us to assess the direction of the error
- The t-test allows us to evaluate if the monthly average demands differ significantly from one another

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Strand 3 – NDM Daily Demand Analysis

Daily Actual & Deemed Demands vs GB CWV:

Daily Actual and Deemed Demands vs GB CWV
01B (across all LDZs)

Legend: **Actual** (black) — **Model** (red) — **Retro** (blue) — **GB CWV** (brown)

NOTE: values are for illustration purposes only

- Consisting of 8 separate charts (for bands 01B to 08B)
- Useful visual representation of values

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Strand 4 – Reconciliation Analysis

Overview

- An assessment of the total levels of Reconciliation (for Class 4 Supply Meter Points)

Comparison Technique(s)

- Analysis of average errors (Actual – Allocated) by EUC

What are the benefits:

- Identify patterns or trends in allocation accuracy (NB: analysis might not be possible across all EUCs)
- Helps to give some context to other strands of analysis

Frequency & Timings

- In order to fully benefit from Algorithm Performance Reporting, results and any future modeling proposals are required as soon as possible following completion of the Gas Year

- November DESC meeting doesn't allow sufficient time to assess all analysis strands – consider moving to a mid December DESC meeting.

Suggested next steps:

- Complete interim (part Gas Year) analysis for remaining months of Gas Year 2016/17, following implementation of UK Link replacement (December 2017 delivery)

- Carry out full Gas Year analysis for future gas years and report Algorithm Performance findings (starting December 2018)